Reducing Costs

High-level waste retrieval, treatment, and disposal and storage tank closure

- Enhanced Sludge Washing-**$5 billion** cost avoidance at Hanford
- Oak Ridge Tanks Remediation-**$350 million** cost avoidance and 10 year reduction in baseline project schedule

Identification, containment and remediation of subsurface contaminants

- Passive Reactive Barriers-**$100 million** cost savings at Rocky Flats and Monticello
- DNAPL Mobilization and Destruction-**$125 million** cost savings at Portsmouth and Savannah River

Qualification of nuclear materials for shipment and disposal

- Supercritical Fluid Extraction (SFE)-**$20 million** cost avoidance at Rocky Flats and Hanford

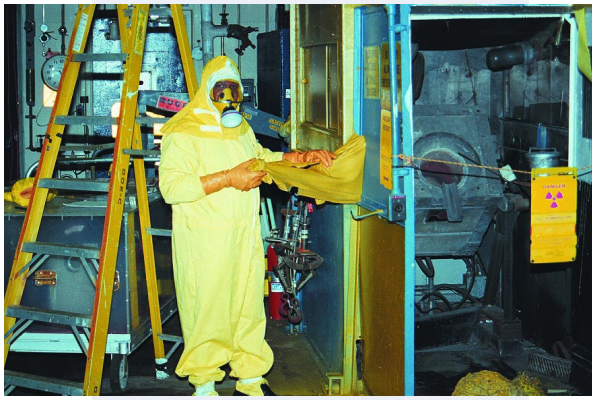
Deactivation and decommissioning of contaminated facilities

- Strippable Coatings for Decontamination-**$10 million** cost savings at Savannah River

Characterization and disposal of mixed waste

- Polymer Macroencapsulation-**$9 million** cost savings for disposal of radioactive lead from many DOE sites

Gunite Tanks Remediation employed robotic equipment to remove radioactive waste from storage tanks at Oak Ridge



Strippable Coatings allow easy removal of surface contaminants for deactivation activities at Savannah River

Passive Reactive Barriers capture and treat contaminant plumes underground at Rocky Flats and Monticello

Enhanced Sludge Washing will reduce by 60% the volume of Hanford tank waste requiring expensive treatment and disposal

Solutions

Enhanced Sludge Washing [#233]

This improved tank waste pretreatment process uses caustic leaching and chromium oxidation to remove non-radioactive chemicals from the sludge. By removing key chemicals such as aluminum, chromium, phosphorous and sulfate from sludge, higher loadings of radioactive components can be achieved in high level waste glass, reducing by 60% the volume of tank sludges requiring expensive treatment and off-site disposal. Almost $5 billion in cost avoidance is included in the Hanford baseline from planned use of this technology.

Oak Ridge Tanks Remediation

This "first of its kind" project removed radioactive sludge from a series of underground waste storage tanks at the Oak Ridge National Laboratory. Robotic and remotely operated equipment was used to clean the tanks and transfer the low-level liquid waste to new stainless steel storage tanks. A total of 30 technologies were used in the project leading to a cost avoidance of $350 million and accelerating the tank cleanup by more than 10 years.

Three technologies used together to remove radioactive cesium from tank waste greatly reduce low-activity waste handling and disposal costs. **Cesium Removal using Crystalline Silicotitanate [#21]** combined with the **Out of Tank Evaporator [#20]** and **Crossflow Filtration [#350]** also avoid major design and operations costs associated with previous methods. The potential complex-wide cost avoidance is in the hundreds of millions of dollars.

Passive Reactive Barrier [#46]

Permeable reactive treatment walls are used to treat/degrade chemicals in groundwater in situ. A permeable, subsurface barrier containing a reactive material (such as granular iron) is constructed across the path of a contaminant plume. When groundwater passes through the reactive barrier, contaminants are either immobilized or chemically transformed to a more desirable state (e.g., less toxic or more readily biodegradable).

DNAPL Mobilization and Destruction

Another technology combination enables rapid and cost-effective removal and destruction of DOE's most prevalent subsurface contaminant - dense nonaqueous phase liquids (DNAPLs). **Dynamic Underground Stripping [#7]** mobilizes DNAPLs and **Hydrous Pyrolysis/Oxidation [#1519]** destroys them underground. The combination yields orders-of-magnitude increases in the remediation rate and has been successfully deployed at the Portsmouth Gaseous Diffusion Plant and the Savannah River Site.

Supercritical Fluid Extraction Moisture Measurement [#3002]

Thousands of kilograms of plutonium materials at DOE sites must be stabilized and repackaged for shipment to long-term storage. But the inadequacies of current moisture measurement technology is jeopardizing site closure milestones and stakeholder agreements. New instrumentation has been developed and deployed to meet closure milestones and criteria for transportation and disposal of nuclear materials. This technique for moisture measurement provides more accurate and reliable results and avoids the need for transporting samples to a laboratory. Deployed at Hanford and will be deployed at Rocky Flats and Savannah River.

Strippable Coating [#2314]

The process applies a plastic membrane or polymer on the contaminated surface. The strippable coating is allowed to cure for up to 24 hours, after which it can be easily peeled or stripped off the surface. The coating traps the contaminants in the polymer matrix. Strippable coatings are non-toxic and do not contain volatile compounds or heavy metals. Since the coating constitutes a solid waste, disposal is easier than treating contaminated liquid wastes. Estimated cost savings at Savannah River Site is $10 million.

Polymer Macroencapsulation [#30]

This innovative technology melts and extrudes molten polyethylene into containers to surround wastes and isolate contaminants from the environment. It enables greater waste loading in each container, reducing handling, transporting, and disposal costs. Named Best Demonstrated Available Technology for radioactive lead soils and mixed waste debris by the EPA, it has been used for disposal of radioactive lead from many DOE sites.